

searches of Drs. Chappuis and Guillaume as to the mass of 1000 cubic centimetres of water at 4°. They find that a cubic decimetre of water weighs 999'936 grammes (p. 413) or 1 kg.-64 mg. Prof. D. Mendeléeff has, however, stated the mass of a cubic decimetre of water at 4° as 999'847 grammes (*Proc. Roy. Soc.*, 1896, p. 155).

The book contains seven interesting portraits of Talleyrand, Delambre and others; also an alphabetical list of more than 400 authors and persons who have taken part in the introduction and verification of metric standards, and a useful chronological table of French laws and ordinances (1557-1896).

We no longer now regard the metre as the length of 1/10,000,000th part of the quadrant of the meridian, or the kilogramme as the precise weight of a cubic decimetre of distilled water. Such derivations and definitions have proved a failure, and very much of the information set out by the author with reference thereto, although of historic interest, might well be condensed in the next edition of the book.

PROF. MAX MÜLLER'S LAST ESSAYS.

Last Essays. By the Right Hon. Prof. F. Max Müller. 1st series. Pp. vii + 360. (London: Longmans and Co., 1901.) Price 5s.

THE seventeenth volume of the late Prof. Max Müller's "Collected Works" contains a series of essays on language, folklore and other subjects which were selected for publication by the venerable scholar about the time that his illness assumed its last acute form; but, alas! he never lived to expand and annotate, according to his wont, such as had already appeared in print before. The greater number of them treat, as we should expect, of the subjects of which he had made a close and lifelong study, and these bear in every paragraph evidences of the clear thought and brilliant exposition which all Prof. Max Müller's readers were accustomed to expect from that expert philologist. In two of them, "My Predecessors" and "How to Work," we get a few glimpses of the man as well as of the scholar, and they cannot fail to interest all those who wonder from time to time how one man, with so many varied interests and occupations, could manage to do so much good work in a single lifetime. In "How to Work" we see the leading ideas which he kept ever before him whilst carrying on his labours of copying manuscripts, editing texts and the like, and when we read the advice which he gave to the students of Manchester College in 1896 we are able to note that we are reading the words of a man who practised what he preached. He said, "Put your whole heart, or your whole love, into your work," and "half-hearted work is really worse than no work"; it is a pity that, like the verses from the Koran which are writ large and hung up on the walls of the mosques where all men may see and read them, these excellent words cannot be copied in large letters and set before the eyes of our boys and girls in schools and colleges. Of equal value is his counsel to them to make indexes to the books that they read, and he pointed his moral admirably when he told them how he worked with slips when making his *index verborum* to his great edition

NO 1654, VOL. 64]

of the "Rig-Veda." But then Prof. Max Müller belonged to a school which produced such scholars as Fleischer, Lepsius, Bühler, Rödiger and Hoffmann, and we cannot help doubting if their modern representatives have the inclination or can find the time to make tens of thousands of index slips. The social life of Universities, even in Germany, makes it more and more difficult for a man to devote years, or months, to tasks of this kind, and a professor finds that lectures, committee meetings, &c., use up, and alas! sometimes waste, a great deal of his time.

The essay on "Coincidences" will be read by every one who is interested in the study of comparative religion with the deepest interest, for in it is demonstrated with considerable clearness and with incontrovertible proofs, if we accept the facts set out by Prof. Max Müller, that Christianity owes much to Buddhism. The Roman Catholic missionaries Huc and Gabet, while travelling in Thibet in 1845, discovered to their horror that the Buddhist priesthood possessed the crosier, the mitre, the dalmatic, the cope, the service with two choirs, the psalmody, exorcism and prayer-beads, and that the celibacy of the priesthood, spiritual retreats, worship of saints, fastings, processions, litanies, holy water, &c., were as much the characteristics of the Buddhist as of the Roman Catholic religion. After thinking the matter over for some time the Christian missionaries made up their minds that these resemblances were the work of the Devil, who wished to lead astray any missionary who ventured to travel in Thibet, and now we know that an actual historical communication existed between Roman Catholic and Buddhist priests. It has recently been proved that the Buddhist Canon was collected at the Council held B.C. 259. at Patna by Asoka, and that the Pāli Canon of Buddhism was written down in the first century before our era, and that the Sanskrit Canon was written down in the first century after. Thus it seems clear that if any borrowing at all took place between the two religions, the Christian borrowed from the Buddhist, and not the Buddhist from the Christian. This need cause no surprise, for, apart from the well-known historical connection which existed between the Buddhists and Nestorians in the seventh, eighth and ninth centuries, there was undoubtedly frequent communication between India and Persia and Asia Minor from the time of Alexander the Great. The Buddhist religion was, like the Christian, a missionary religion, and in proof of this Prof. Max Müller has adduced some very interesting facts.

There are many other essays in the volume to which we should, if space permitted, like to call attention, and among them are those on "The Savage" and "Literature before Letters." The former was first printed in 1885 in the *Nineteenth Century*, and we cannot help thinking that had its learned author lived to see it reprinted he would have modified several sections of it; the latter is full of interest, as much for the subject of which it treats as for the indications it gives of Prof. Max Müller's extraordinary power of memory. Finally, Oxford men will read with pleasure the appreciation of the late Dean Liddell which is found on p. 314 ff.; and historians of modern Europe will find much information on the famous Schleswig-Holstein Question in the last essay in the

volume. It is almost superfluous to add that the style in which the essays are written is clear and fluent, and we are sure that even the scientific opponents of the great Sanskrit scholar will be glad to possess in a collected and handy form some of the last writings of a man who has scored his mark broadly and deeply upon the edifice of Indian philology.

HETEROCYCLIC ORGANIC COMPOUNDS.

Die Heterocyklischen Verbindungen der Organischen Chemie. By Edgar Wedekind. Pp. iv + 458. (Leipzig: Veit and Co., 1901.) Price 12 marks.

THE author of the book before us states in his preface that his object is to extend those chapters of the elementary treatises on organic chemistry which deal with heterocyclic derivatives, to supply a text-book of the subject for the use of advanced students and the technical chemist, and thus to render unnecessary the possession of exhaustive and expensive text-books.

But, with the best will in the world, we regretfully come to the conclusion that the work is of very slight practical value; heterocyclic derivatives are frequently derived from straight chain compounds possessing complex molecules, and the chemist will find himself compelled to refer to one of those works Dr. Wedekind would avoid the use of in order to elucidate the synthesis of the heterocyclic ring.

One example of this difficulty, which may, indeed, be met with on almost every page of the book, will suffice; speaking of the methods of formation of osotriazoles, we find given as the second method: "intermolecular separation of the elements of water from the hydrazo-oximes of 1:2-diketones



Now unless the student or technical chemist had made a special study of the hydrazo-oximes he would possess the vaguest idea of their method of formation, and would have to refer to a text-book. A well-known and inexpensive work of this nature ("*Organische Chemie*," Richter, ninth edition), under the heading α -hydrazo-oximes, describes, not only the formation of these bodies, but also, on the same page, their intramolecular condensation to the heterocyclic ring.

Dr. Wedekind has adopted an empirical classification which brings substances of most dissimilar constitution under the same heading; for example, in the group—Hetero-rings containing five members:

I. Oxygen as member of the ring.

(1) Single rings with one oxygen, we find the following bodies, which possess slight genetic connection: furfuran, tetramethylene oxide, γ -lactones, and anhydrides of the acids of the succinic series (it is true the author announces his intention of passing over reduced and easily resolvable rings, such as anhydrides and lactones, but to be consistent, should not a reduced ring, such as piperidine, be also ruled out of court?)

Nor does Dr. Wedekind's system even possess the merit of originality; this system first appeared in the seventh (German) edition of Richter's "*Organic Chemistry*," and has been adhered to in subsequent

editions; it was adopted by Brühl from Anschütz and Schroeter (editor and sectional editor of the above work) in his continuation of the German translation of Roscoe and Schorlemmer's "*Organic Chemistry*" (vols. vi. and vii.).

The genetic or rational system of nomenclature was adopted by Krafft in 1893, and is to be found, further freed from empiricism, in the last instalment of Meyer and Jacobson's "*Organic Chemistry*" (the group of the polynucleic benzene derivatives, 1901).

A due sense of the proportionate importance of certain classes of bodies is frequently absent; thus the very important purine group is dismissed in a few pages as an appendix to the benzopyrimidine group, purines being considered as glyoxalinepyrimidines.

For the rest, the book, which contains an enormous amount of information, seems carefully compiled, up-to-date and accurate; we prefer to find the references at the foot of the page instead of being collected at the end of the first and of the second part; out of 1475 references there are fifteen to English publications, which, considering the amount of work which has been done in this country on heterocyclic rings, seems scarcely a fair proportion.

In view of the facts that the ninth edition of V. von Richter's "*Organic Chemistry*" (Anschütz-Schroeter) has appeared, and that Messrs. Veit and Co. promise the rapid completion of Meyer and Jacobson's admirable handbook, we can only repeat that such books as the one which forms the subject of this notice are completely superfluous.

W. T. L.

OUR BOOK SHELF.

The Induction Motor. A Short Treatise on its Theory and Design, with numerous Experimental Data and Diagrams. By B. A. Behrend. Pp. 105. (New York: *The Electrical World and Engineer*, 1901.

MR. BEHREND, in the preface to his book, rather offers an apology for adding one more to the already overwhelming number of books dealing with electricity and its applications. In some cases an apology of this kind is, unfortunately, justified; but in this instance, in view of the very great importance of the subject from the electrical engineer's point of view and the increasing introduction of polyphase electrical installations, a work on the above subject, written by a writer who, from his continental experience, should know what he is talking about, is to be welcomed. The author's point of view is made clear by a quotation from Prof. J. J. Thomson, printed on the title-page: "The absence of analytical difficulties allows attention to be more easily concentrated on the physical aspects of the question . . . than if he merely regarded electrical phenomena through a cloud of analytical symbols"; and on a first glance at the book, which consists of only 105 pages, one had hoped for a concise and easily comprehensible statement of the subject. This cannot, however, be said to be the case. The book could be very conveniently entitled "*A notebook for the designer of induction motors*," and to an electrical engineer well versed in polyphase work it would be, without doubt, very useful. The reader who does not possess these qualifications will not find it of much value. The author admits this, in that he adds an appendix containing an extract from Gisbert Kapp's "*Electric Transmission of Energy*," dealing with the elementary theory of the induction motor, and says that after reading this the reader will be better able to understand his own diagrams and deductions. We think, however, that the author